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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/077,945	02/19/2002	Jeffrey T. Cheung	01SC134US1	6713

7590 11/04/2003

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EXAMINER

JONES, JUDSON

ART UNIT	PAPER NUMBER
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2834

DATE MAILED: 11/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/077,945	CHEUNG ET AL.
Examiner	Art Unit	
	Judson H Jones	2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 29 August 2003 .

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-65 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-27,29 and 36-65 is/are rejected.

7) Claim(s) 28 and 30-35 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 4/8/2002 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. ____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892) 4) Interview Summary (PTO-413) Paper No(s). ____ .
2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) Notice of Informal Patent Application (PTO-152)
3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ . 6) Other: ____ .

DETAILED ACTION

Applicant's arguments with respect to claims 1-60 have been considered but are moot in view of the new ground(s) of rejection.

Claim 9 is objected to because of the following informalities: The word "odes" in line 2 should be "modes." See page 10 line 23 of the specification and see the original claim 9. Appropriate correction is required.

Claim 11 is objected to because of the following informalities: The original claim 11 read, "a critical angle of displacement ... of less than 1 degree." The amended claim 11 reads "a critical angle of displacement ... of not less than 1 degree." There is no underlining to indicate that the change to claim 11 was intentional and there is no support in the specification for the new language.

Claim 45 is objected to because of the following informalities: The original claim 45 in line 3 read, "a support structure." The amended claim 45 reads, "a support tructure."

According to the Revised Notice, AMENDMENTS MAY NOW BE SUBMITTED IN REVISED FORMAT published in the official gazette February 25, 2003, "The text of pending claims not being currently amended that are under examination shall be presented in a clean version in the listing. Any claim presented in clean version constitutes an assertion that it has not been changed relative to the immediate prior version." The clean version of the claims provided by applicant on 8/23/2003 either was not proof-read or was inadequately proof-read. Claims 1-60 need to be checked for errors.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konotchick 5,818,132 A (of record) in view of Hoffman 4,645,960 A. Konotchick discloses a dynamic magnet system having a support structure, a plurality of magnets 2 orientated in polar opposition as described in column 11 lines 40-41 but does not disclose ferrofluid bearings. Hoffman teaches using ferrofluid bearings for a shaft. Since Hoffman and Konotchick are from the same field of endeavor (in this case, the motor structure field with Konotchick being classified in 310/17, reciprocating motor structure and Hoffman being classified in 310/90.5, bearings for electrical motors or generators), it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized ferrofluid bearings in the device of Konotchick in order to reduce energy losses from friction and to thus improve the efficiency of the device.

In regard to claim 5, see element C in Konotchick figure 15.

In regard to claim 6, see Konotchick column 2 lines 27-29.

In regard to claim 7, see Konotchick column 1 lines 25-27.

In regard to claim 8, see elements 110, 111 in Konotchick figure 15.

In regard to claim 9, see Applicant's specification page 16 lines 10-27 for an explanation of the claimed multiple oscillation modes. As explained in Konotchick column 11 lines 40-41, the magnets 2 are suspended by polar opposition between each other and by end magnets 110, 111. Since each magnet 2 is oscillating between a fixed magnet 110 or 111 and another moving magnet 2, the magnets of Konotchick will necessarily have multiple oscillation modes.

In regard to claim 10, see Konotchick column 6 lines 38-44.

Claims 2-4, 11-17, 19-23, 36-39, 41, 42, 44-49, 50-53 and 55-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konotchick in view of Hoffman, Raj et al. 5,851,416 A and Raj et al. 5,908,987 A (of record). Konotchick as modified by Hoffman discloses the dynamic magnet system but does not disclose a critical angle of displacement of less than one degree. Konotchick will inherently have a critical angle of displacement but even with a ferrofluid bearing as taught by Hoffman, this critical angle would probably not be close to less than one degree. Raj '416 teaches in column 8 lines 45-48 blending a ferrofluid with polydimethylsilicone oil or an oil surfactant mixture to change the viscosity of the ferrofluid. This dilution of the ferrofluid to achieve low viscosity makes possible a critical angle of displacement of less than one degree. Raj et al. '987 teaches in column 4 lines 13-15 making a ferrofluid with a viscosity of less than 5 cp at 27°C. Since Raj '416, Raj '987 and Konotchick as modified by Hoffman are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have diluted a ferrofluid in a magnet device bearing in order to achieve a desirable viscosity for the fluid. It further would have been obvious at the time the invention was made for one of ordinary skill in the art to modify the magnet system with the ferrofluid bearing to establish static coefficients of friction between the magnets and the support structure less than about 0.02 and a critical angle of displacement for the magnets from a horizontal static position of less than 1 degree or less than 10 minutes since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See In re Aller, 220 F. 2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

In regard to claim 13, see Konotchick column 11 lines 40-41, where the magnets 2 are described as being suspended by polar opposition between each other and by end magnets 110, 111. Since each magnet 2 is oscillating between a fixed magnet 110 or 111 and another moving magnet 2, the magnets of Konotchick will necessarily have multiple oscillation modes.

In regard to claim 14, the dynamic magnet system of Konotchick is used for harvesting energy as described in column 1 lines 25-28. Electric generators are used for harvesting mechanical energy by transforming it into electrical energy.

In regard to claim 15, see Konotchick column 2 lines 27-29.

In regard to claim 16, see the abstract of Hoffman.

In regard to claim 17, see Raj et al. '987 column 4 lines 12-15.

In regard to claim 19, see elements 110, 11 in Konotchick figure 15.

In regard to claim 20, see Konotchick column 6 lines 38-44.

In regard to claim 21, see Konotchick column 1 lines 27-28.

In regard to claim 22, the limitations to this claim are the same as the limitations in claim 11 except the device is called an energy harvester instead of a dynamic magnet machine, the limitation of a conductor to produce an electric signal has been added and the limitation of multiple oscillation modes has been added. See Konotchick column 1 lines 27-28 for the energy harvester limitation and see Konotchick figure 15 elements 98 for the conductor. In regard to the multiple oscillation modes, see Applicant's specification page 16 lines 10-27 for an explanation of the meaning of this limitation. As explained in Konotchick column 11 lines 40-41, the magnets 2 are suspended by polar opposition between each other and by end magnets 110, 111.

Since each magnet 2 is oscillating between a fixed magnet 110 or 111 and another moving magnet 2, the magnets of Konotchick will necessarily have multiple oscillation modes.

In regard to claim 23, see *In re Aller*, 105 USPQ 233, 235 (CCPA 1955) "More particularly where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." The critical angle of less than 10 minutes is viewed as being an optimum range discoverable by routine experimentation.

In regard to claims 36-39 and 41-43, these claims repeat the limitations of claims 1, 2, 9, 5, 15, 19 and 7 with the addition of the limitation of "said support structure orienting said magnets for primarily horizontal movement." This feature is taught by Konotchick in column 7 lines 46-50. The other limitations have been addressed above, and the arguments will not be repeated.

In regard to claims 45-48, these claims repeat the limitations of claims 11, 12, 9 and 5 with the addition of the limitation of "said support structure orientating said magnets for primarily horizontal movement." This feature is taught by Konotchick in column 7 lines 46-50. The other limitations have been addressed above, and the arguments will not be repeated.

In regard to claims 50-53 and 55-60, these claims repeat the limitations of claims 11, 12, 9 and 5 with the addition of the limitation of "a support structure having a ring-shaped axis." This feature is taught by Konotchick in column 7 lines 46-50. The other limitations have been addressed above, and the arguments will not be repeated.

In regard to claims 61-65, when a ferrofluid bearing is utilized in the Konotchick device, the opposition to the movement of the magnets from friction and viscous drag is greatly reduced.

This results in the movement of the magnets being opposed substantially only by the polar opposition of the magnets to each other. Besides the substantially only by the polar opposition limitation, claims 60, 61, 64 and 65 repeat limitations from claim 1, 5 and 9. Those limitations have been addressed above, and the arguments will not be repeated.

Claims 18, 40 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konotchick in view of Hoffman, Raj et al. '416 and Raj et al. '987 as applied to claims 16, 38 and 52 and further in view of Furumura et al. 4,485,024 A (of record), Raj 6,103,107 A and Hou et al. 5,587,242 A. Konotchick as modified by Hoffman, Raj et al. 5,851,416 A and Raj et al. 5,851,416 A discloses the energy harvester but does not disclose a ferrofluid comprising a light mineral oil medium mixed with isoparaffinic acid. Raj et al. '416 teaches using a hydrocarbon as a liquid carrier in column 2 lines 25-27 but does not specifically mention mineral oil. Hoffman only mentions a liquid carrier in column 1 lines 18-20. Furumura et al. teaches in column 1 lines 28-37 that "the oil group such as a mineral oil, a synthetic oil, etc., the ester group and the ether group are most suitable" for a ferrofluid used as a lubricant in bearings. Since Furumura et al. and Hoffman are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a mineral oil based ferrofluid in the Hoffman device in order to provide lubrication for the bearing as well as to provide a dispersing medium for the ferrofluid. Raj '416 teaches in column 8 lines 45-48 blending a polydimethylsilicone ferrofluid with polydimethylsilicone oil or an oil surfactant mixture to change the viscosity of the ferrofluid. Since Raj '416 and Hoffman as modified by Furumura et al. are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have diluted the mineral oil ferrofluid

with a liquid compatible with mineral oil in order to change the viscosity of the ferrofluid. Raj '107 teaches Isopar is a commercially available low molecular weight refined hydrocarbon solvent and Isopar can be used in ferrofluids. Since Furumura et al., Raj '107 and Konotchick as modified by Hoffman, Raj et al. '416 and Raj et al. '987 are from the same field of endeavor, it would have been obvious at the time the invention was made for one of ordinary skill in the art to have selected a light mineral oil carrier fluid for the fluid in a ferrofluid bearing and it would have been obvious to have diluted the light mineral oil based ferrofluid with Isopar in order to reduce the viscosity of the ferrofluid and thus reduce the losses due to viscous drag in a energy harvester. The selection of a known material (in this case, Isopar) on the basis of suitability for its intended use (in this case, a diluting fluid for a mineral oil based ferrofluid) is not viewed as a patentable advance. See *In re Leshin*, 125 USPQ 416 (CCPA 1960). Hou et al. is cited for teaching that Isopars are coparaffinates comprising mixtures of water-insoluble isoparaffinic acids partially neutralized with hydroxybenzidialiphatic amines. Since Isopars contain isoparaffinic acids, mixing a mineral oil with Isopar would necessarily satisfy the limitations of claim 18.

Claims 24, 25 and 29 are rejected under 35 U.S.C. 103 as being anticipated by Oster 5,950,543 A. Oster discloses a dynamic magnet system with magnets 420 on capsules 300, the capsules being individually movable relative to a support structure and having magnetic poles in polar opposition as described in column 22 lines 14-18 and where there is an unobstructed magnet movement path between individual magnets. While capsule 300 may have several magnets on it as described in column 22 lines 12-14, the magnets are all doing the same thing. The magnets serve to suspend the capsule with repulsive forces and act to prevent collisions

between capsules. According to *In re Lockhart*, 90 USPQ 214 (CCPA 1951), “Although it is true that invention may be present under some circumstances in making integral that which was separate before, we do not feel that such is the case here. Improved results only will not take the case out of the general rule. There is also a requirement that the unification or integration involve more than mere mechanical skill.” In the Oster device, it is easier to use a lot of little magnets instead of one big magnet. In regard to the even number of magnets limitation, in the Oster device it makes no difference whether an even number or an odd number of magnets are in the system, as the only time the magnets interact with one another is when a collision is being prevented.

In regard to claim 25, the magnets of the two capsules at the extremes of the Oster transport system can be considered “end magnets.” The collision prevention repulsion forces would then limit the travel of the moving magnets.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oster in view of Sakamoto et al. 5,471,100 A. Oster teaches in column 15 lines 63-67 using sensing means according to the known art but does not specifically mention coil sensing means. Sakamoto et al. teaches in column 4 lines 28-31 using a magnet and a sense coil for detecting position. Since Sakamoto et al. and Oster are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a sensing coil and a magnet for position detection in place of the laser sensing means described by Oster in, for example, column 15 lines 3-5, in order to reduce the cost of the device.

Claims 50-53 and 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konotchick in view of Hoffman, Raj et al. ‘416, Raj et al. ‘987 and Roth 4,965,864 A (of

record). Claims 50-53 and 55-60 repeat the limitations of claims 1-3, 5-7, 11, 12 and 36 with the addition of the limitation of “a support structure having a ring-shaped axis.” This feature is taught by Roth in figure 6 and in column 6 lines 11-13 where the ring-shaped axis is disclosed as being used for the purpose of improving the movement of fluid by providing a continuous flow and a uniform direction. The ring-shaped axis also improves the movement of the pistons of the linear motor, which travel in the same direction as the fluid. Since Roth and Konotchick as modified by Raj et al. ‘416 and Raj ‘864 are from the same field of endeavor it would have been obvious at the time the invention was made for one of ordinary skill in the art to have utilized a ring-shaped axis in order to improve the movement of plurality of magnets by providing a continuous motion and a uniform direction.

Allowable Subject Matter

Claims 28 and 30-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In regard to claim 28, this limitation would be met by a dynamic magnet system operating as a generator. However no generator with an even numbers of magnets oriented in polar opposition and moving with respect to a support structure where the structure provides an unobstructed movement between the magnets has been found. While it is known in the art that any motor can be used a generator and vice versa, making the evacuated tube transport of Oster into a generator does not appear to be obvious or feasible. In regard to claim 30, while it is known in the art that ferrofluid bearings can be used with linear motors, adding a ferrofluid bearing to the Oster device does not appear to be obvious or feasible. In regard to claim 34, Oster discloses in column 22, “If due to a failure of the system two capsules

attempt to merge into the same tube at the same time the magnets repulse in a unstable manner . . ." That sentence implies some sort of oscillation, but the magncts in Oster are not designed to oscillate. The language of claim 34 does not appear to read on Oster. In regard to claim 35, the dynamic magnet system of Oster would necessarily have a critical angle of displacement. However, the support structure of Oster is a tube fixed to the ground or buried in the ground, and therefore the critical angle of displacement for the Oster device is not known.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

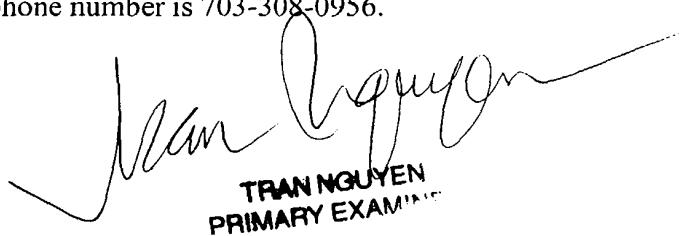
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Judson H Jones whose telephone number is 703-308-0115. The examiner can normally be reached on 8-4:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on 703-308-1371. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



JHJ 10/24/2003



Tran Nguyen
TRAN NGUYEN
PRIMARY EXAMINER